21-31 New Oxford Street Development Ltd

The Post Building

Air Quality Assessment

TPB-ARP-ZZZ-XX-RP-Z-00-0001

Issue 01 | 1 October 2019

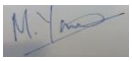
Job number 255887

Ove Arup & Partners Ltd
13 Fitzroy Street
London
W1T 4BQ
United Kingdom
www.arup.com

ARUP

Document verification

ARUP

Job title		The Post Building			**Job number** 255887
Document title		Air Quality Assessment			**File reference**
Document ref		TPB-ARP-ZZZ-XX-RP-Z-00-0001			
Revision	**Date**	**Filename**	Air quality report_draft.docx		
Draft 1	1 Oct 2019	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Michael Young	Michael Bradbury	Michael Bradbury
		Signature			
Issue 01	1 Oct 2019	**Filename**	TPB-ARP-ZZZ-XX-RP-Z-00-0001.docx		
		Description			
			Prepared by	Checked by	Approved by
		Name	Michael Young	Michael Bradbury	Michael Bradbury
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document verification with document	✓

Contents

1 Introduction

This report has been prepared on behalf of 21 – 31 New Oxford Street Development Ltd to assess the potential effect of the proposed tenant generator installation, within the ground floor unit of 21-31 New Oxford Street, on air quality in the surrounding area.

This proposed generator installation is to support the essential business continuity of an incoming tenant, who it is intended will occupy the first 4 office floors of the building, as well as the retail (Class A2) space immediately in front of and adjacent to the proposed generator plantroom.

As described, the generators are proposed to support the essential business continuity and will only ever be used in the event of a power outage, and for occasional periodic testing.

This report describes the proposals for generator exhaust, identifies the anticipated pollutant concentrations, and compares against the UK National air quality objectives; as well as looking at strategies to mitigate the risk of higher pollutant concentrations.

A more detailed assessment which also takes account of the locally measured air quality levels is being prepared to supplement the findings of this report.

2 Proposed Ventilation Strategy

The business continuity resilience required by the tenant involves the installation of 3 no. generators (operated in a duty/assist/standby configuration) in a purpose-built plant enclosure on the ground floor behind a retail unit (shown in Figure 1 below in red hatch) on New Oxford Street.

The tenants design team have completed an initial design review process to determine the specification of the proposed generators and the layout of the plant space as shown in Figure 1.

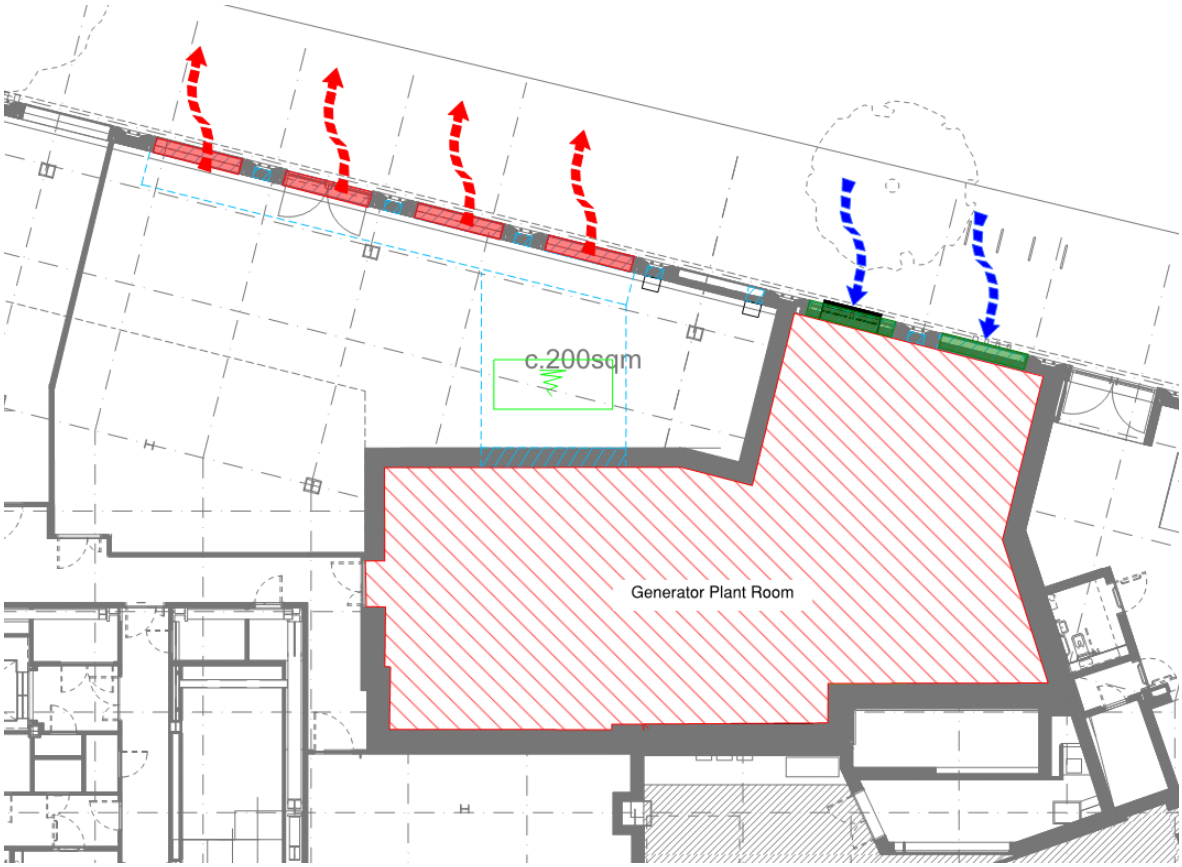


Figure 1 – Proposed Plantroom/retail unit layout

The generator room requires sufficient ventilation for cooling the generators and providing air for combustion. This airflow will require a series of new air intake & exhaust louvres in the facade. The tenants have advised that they will require a louvre area of 19.5m^2 and 17.63m^2 for the air intake and exhausts respectively.

In order to accommodate the required amount of louvre area to provide the necessary air flow, it is proposed that the louvres will be arranged predominantly at high level (~4m above pavement level) on the northern façade of the building (adjacent to New Oxford Street), as well as a single full height louvre at the Eastern end of the façade. The position of these louvres is indicated on both the above plan image, and the below building elevation image (with intake air shown in green, and

exhaust in red). In between there is a louvre provided for the ventilation of the retail unit.

Other locations within the building for the installation of the generators have been investigated but have been ruled out due to either technical or spatial constraints.

Figure 2 – North Building Elevation: Generator Intake (green) & Exhaust (red) Air Louvre Positions.

As well as the cooling airflow, the generators will also require intake air for combustion, and will have exhaust gases from the combustion process, containing pollutants.

The proposed exhaust gas discharge strategy is to mix the exhaust gases with the cooling airflow, to dilute the pollutant concentration, and discharge from the building at high level ground floor.

The principle of flue gas dilution will lower the overall concentrations of pollutants by combining the cleaner outside air, used for cooling, with the exhaust gases from the combustion process. This outside air dilutes the generator waste gases before terminating through the discharge louvres. These systems are designed on the principle of diluting the vented products of combustion to reduce the concentration of air pollutants emitted.

The generators will be specified to be TA-Luft, which is the comprehensive German air pollution control regulation. This will ensure that the engines are efficient and therefore minimising emission release from source.

3 Expected Generator Usage

The generator usage is designed to be minimal, consisting of periodic testing (~1 hour per quarter) and then emergency use only (in the event of a power failure), perhaps on 1 or 2 occasions per year. The predicted usage of the generator is likely to be a maximum of up to 15 hours per year.

The fuel tanks are designed to allow the generators to run for 48 hours (in the event of a power outage only). However, this represents the absolute worst-case scenario, and the generator is never expected to be used in this way.

The projects utilities specialist, TUSC, have confirmed that UKPN have encountered only 91 minutes of power outages to the infrastructure serving the building since 2015, of which only 1 minute has been since recent infrastructure upgrades which were completed at the end of 2017.

These outages are detailed as follows;

- one minute on 2nd May 2019:
- 90 minutes (supply went off at 19:43 and restored at 21:13) on 31st January 2015 Pre-arranged shutdown (maintenance, doesn't count as a fault) on 21st October 2013.

The tenant has also advised that in their other buildings, generators were required to run due to power loss typically less than once per annum for varying durations, but not witnessed to exceed a 1hour period.

The above data supports the assumption that the frequency of local power failure would mean the generators would be run very infrequently and for short periods of time. Whilst the Camden Clean Air Action Plan (2019 – 2022) specifically mentions Building Emissions as 1 of their 7 Clean Air Action Plan Themes, the fact that the generator is expected to be utilised so rarely it is considered that this proposal would not contravene this.

4 Pollutant Concentrations

Within the UK National air quality objectives (provided by Defra), the following objectives are specified:

• Nitrogen dioxide – 200µg/m³ not to be exceeded more than 18 times a year (1 hour mean), and an annual mean of 40µg/m³.

• Nitrogen oxides – 30µg/m³ (annual mean) (this is applicable to sensitive vegetation only and not human health)

• Carbon monoxide – 10mg/m³ (8 hour mean)

• Polycyclic aromatic hydrocarbons – 0.25ng/m³ (annual average)

• Particulate Matter: PM¬10 – 50µg/m³ not to be exceeded more than 35 times a year (24 hour mean), and an annual mean of 40µg/m³.

• Particulate Matter: PM¬2.5 – Target a 15% to 20% reduction in concentrations at urban background levels (annual mean)

Air Quality Standards are concentrations recorded over a given time period, which are considered to be acceptable in terms of what is scientifically known about the effects of each pollutant on health and on the environment. They can also be used as a benchmark to indicate whether air pollution is getting better or worse.

The following calculation shows the anticipated pollutant concentrations (utilising the flue gas dilution strategy described previously) at the point of discharge from the louvres. After the point of the discharge the pollutants will mix with the outside air and disperse.

Exhaust Dilution Calculation:

Combined Airflow	13.8	m^3/s
Combined Temperature	130.93	°C
Combined NOx Conc.	82.59	mg/m^3
Combined CO Conc.	7.89	mg/m^3
Combined HC Conc.	1.59	mg/m^3
Combined PM Conc.	0.77	mg/m^3

- NOx refers to the combination of NO and NO_2 (nitrogen monoxide and nitrogen dioxide).
- CO refers to Carbon Monoxide, HC to Hydrocarbons and PM to Particulate matter.

An assessment of these figures against policy is given below and relates to these emissions only at the point of discharge from the louvres and does not account for other external factors.

4.1.1 NOx concentrations

We have only been able to obtain the combined NOx emissions from the generator supplier and not the breakdown of NO_2 and other NOx emissions. For NO_2 emissions the limit should not be exceeded more than 18 times a year, but as the generator is only expected to run periodically for a total of 15 hours, it would not run beyond this threshold.

4.1.2 CO concentrations

The generator emissions of 7.89mg/m^3 will be below the 10mg/m^3 limit at the point of discharge at the louvres.

4.1.3 PM

For PM emissions the limit should not be exceed more than 35 times a year, but as the generator is only expected to run periodically for a total of 15 hours, it would not run beyond this threshold.

4.2 Pollutant Mitigation

The proposed dilution strategy will also mitigate the risk of pollutant concentrations by discharging at high level above the pavement (~4m). The high temperature of the discharge air will create a buoyancy naturally taking the pollutants away from the occupied zone at street level.

The size of the generators has also been optimised, through use of load shedding and intelligent controls.

As the tenant occupies the space immediately above the generator room, as part of their operational strategy they will ensure that any windows are closed when the generators are running.

The next tenant in the building is over 12m above the generator discharge.

The adjacent retail unit (also to be occupied by the same tenant) will need to be designed such that the air exhaust louvres are in the bay adjacent to the generator exhausts and the air intakes further away, to keep the generator exhaust from being pulled into their louvres.

5 Conclusion

Due to the infrequent use of the generators, the emission limits at the point of discharge of the louvres would not be exceeded more than the stated amount for NO_2 and PM. CO emissions are below the required limits.

The exhaust louvres are also located 4m above street level away from pedestrians and the adjacent windows would be closed reducing exposure to these emissions.

Based on the above findings we recommend that the proposed location for the generators and proposed louvre locations should be supported by LBC.